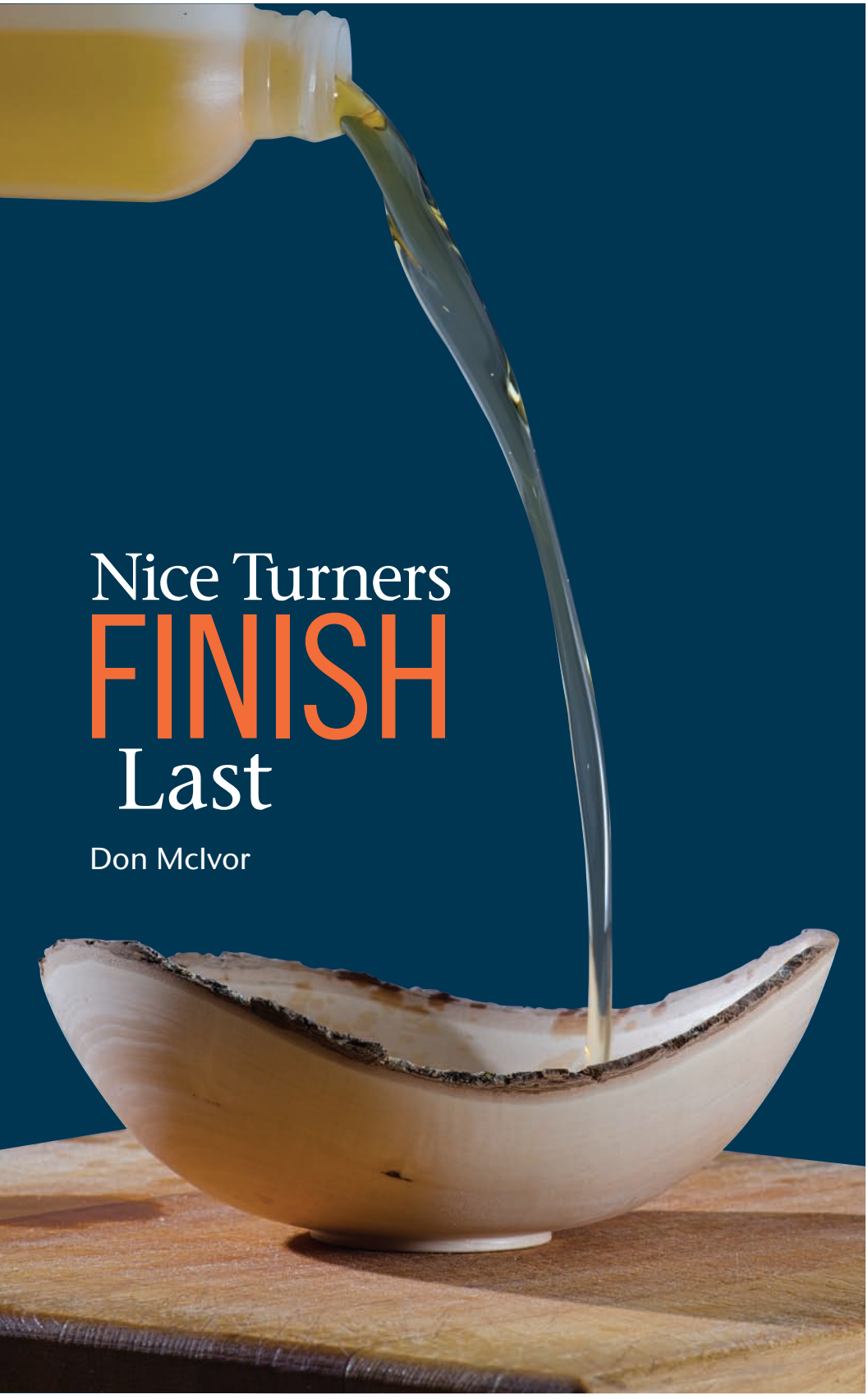
Nice Turners FINISH Last

Don McIvor



Oil finishes are forgiving to apply: pour (or wipe) them on and remove the excess oil before the finish begins to cure.

When it comes to the magic moment of applying a finish to a turned piece of wood, most turners reach for an oil-based product. Oil-based finishes are well suited for turnings because they are relatively forgiving in their behavior and the first coat can often be applied while the piece is on the lathe. Oil finishes enhance grain contrast and bring depth and warmth to wood, contributing to the aesthetic gratification we all get from the medium. But narrow your choices down to an "oil-based finish" and you will still be faced with a bewildering number of options. Add in the abundance of misleading information from finish manufacturers, and it is no wonder many turners settle on one or two options and use those without a lot of further thought. If a perfect finish existed, we would all be using it. The choice of finish is almost always a compromise, and it is good to know the tradeoffs you are accepting.

Types of oils

To be suitable for finishing, oil should cure after it is applied to wood. Curing is a chemical reaction mediated by oxygen that results in the cross-linking of fatty acids in the oil. The result is a change in state from fluid to a solid polymer of interlinked molecules. But not all oils cure. In fact, oils can be classified into one of three groups: non-curing, semi-curing, and curing.

Non-curing oils include mineral oil, peanut oil, and olive oil. Applied to wood, these oils remain viscous and can transfer to other surfaces (hands, tablecloth, furniture), will limit options for repair (they inhibit glue adhesion), and in the case of natural oils, potentially turn rancid and impart undesirable odors or

Six coats of eight finishes applied to curly maple. (1) Boiled linseed oil (3) walnut oil and (6) Watco Danish Oil show little or no build and a matte surface. (2) Thinned tung oil and (4) polymerized tung oil are beginning to build a semi-gloss sheen. (7) Minwax Antique Oil Finish and (8) Formby's Tung Oil Finish show a semi-gloss surface. (5) The shopmade thinned oil/varnish blend shows the most surface build and a gloss surface.

flavors. Because they never harden, they provide no protection from physical damage.

Semi-curing oils include corn, sesame, soybean, safflower, and sometimes walnut oil. In their raw form, these oils partially cure and remain soft. Manufacturers incorporate some of these oils into wood finishes with the addition of drying agents, thinners, resins, or heat treatment, all of which speed curing and help produce a harder finish. This is also our first opportunity for confusion. Walnut oil is sometimes semi-curing and sometimes a curing oil. This is probably because the concentration of the polyunsaturated fats that moderate curing may vary depending on growing conditions and processing. Walnut oil for finishing should contain enough of the fats to make it a curing oil. When these oils are destined for the grocery store, manufacturers include additives to inhibit curing to extend shelf life. Purchasing from the grocery store moves these oils into the non-curing category.

Curing oils include linseed, tung, and walnut oil. Applied to a porous surface, all of these oils cure to a matte finish. They also remain relatively soft in comparison with other finish options such as varnish.

Types of oil finishes

Raw oil

Raw oil is rarely applied to woodturnings because it cures slowly—on a time scale of days- (walnut, tung) to-months (linseed). Raw oils do not build a film surface on the wood, and therefore offer negligible protection against physical damage. Linseed oil imparts a yellow tone and will continue to yellow with age. Tung oil imparts some color to wood but less than linseed oil, and its color changes little with age. Walnut oil imparts the least color and it is non-yellowing. Tung oil provides some water resistance after about six coats; walnut oil offers little water resistance; linseed oil offers the least. These characteristics tend to accompany these oils as they are combined with other products or are processed to improve their application and finishing qualities. The greatest utility for these oils in the turner's shop is that they constitute the basic ingredient for creating your own finish (see sidebar).

Thinned oils

Thinning linseed, tung, or walnut oil with solvent makes an easily applied wipe- or brush-on finish that cures quickly. This approach to finishing is simple, inexpensive, and produces a matte finish *(Photo 1)*. Successive coats are easy to apply, and waiting about a day between coats assures adequate curing between applications. This is my preference for production pieces, and I often apply only one coat of finish with the understanding the user will soon need to oil the piece if the object is used for food service. ▸

After ten years and about a dozen maintenance coats of thinned tung oil, my fruitwood rolling pin remains a pleasure to use.

Five coats of an oil/varnish blend and a surface film has begun to build a semi-gloss surface on this quilted-walnut bowl.

The first coat of thinned oil can be applied on the lathe. A shop towel held against the rotating work will generate heat to speed the rate of curing. I often follow the oil with a paste wax. This provides luster and modest protection for the piece as it is handled in a gallery or craft show. Be aware that wax can trap moisture and encourage mold.

Boiled linseed oil

Once upon a time, linseed oil was boiled to hasten its curing rate. These days, manufacturers blend linseed oil with metallic driers to achieve the same objective, retaining the name despite the absence of boiling. More coats can be applied in a far shorter time, but the result is still a soft finish that offers negligible water resistance.

Polymerized oil

The curing process can be hastened by heating raw oil to about 500˚F (260˚C) in the absence of oxygen to produce polymerized oil. So modified, these oils look and behave more like varnish than raw oil. Polymerized oil cures quickly, can be thinned for easier application, will build a surface film, and is well suited for turned objects. Mahoney's Utility Finish is a walnut oil product that appears to be at least partially polymerized during the manufacturing process, improving its curing rate. Lee Valley markets polymerized tung oil as well as raw walnut oil, and provides directions for heating the latter prior to application to speed curing.

Oil/varnish blend

Manufacturers create varnish by heating oil combined with a synthetic resin. The resulting product is no longer oil, but a new substance with its own properties that make it one of the most durable finishes, but also challenging to apply well. Manufacturers blend oil with varnish to capture some of the beneficial properties of each. Minwax's Antique Oil Finish, Tung Oil Finish, and Watco's and Deft's Danish Oil finishes are four readily available oil/varnish blends.

Most of these products allow subsequent applications in eight to 24 hours. Each gives a slightly different appearance to the finished wood, probably due to the quantity of resins in the varnish, and the type of oil each manufacturer uses. Some of these products will build a surface film after numerous applications, while others show little or no build after five applications. Imaginative marketing creates a lot of confusion in this and the wiping-varnish categories. Danish oil contains no Danes, but is a blend of linseed oil and varnish. Lax regulation permits a product to be labeled "tung oil finish" (for example), yet contain no tung oil at all.

Wiping varnish

Finish guru Bob Flexner defined this category of finish to distinguish products combining varnish and thinner. The products are not truly oils, but are often marketed as such. Products in this category include Formby's Tung Oil Finish, Waterlox Original Formula, and General Finishes Salad Bowl Finish. These finishes build a surface film, creating a satin or glossy surface. If you wish to achieve a varnished look, this is a good way to go. While glossy surfaces may attract buyers, they create a maintenance challenge for non-woodworkers

when the film surface becomes worn or damaged, and worn items may get relegated to the next yard sale.

The manufacturers' goal here, as with oil/varnish blends, is to make these products easier than varnish alone to apply. On non-horizontal surfaces, these finishes need a thin application to prevent sags or drips, thus requiring more applications to build depth. These finishes are dust magnets before they cure, and invariably result in captured dust and lint. Sanding lightly between applications with 320-grit abrasive smoothes the surface, but the last finish application must be kept dust-free until it cures.

Choosing an oil finish

I have developed a decision-making process that helps me narrow finish options before I start work on a piece. I first consider how the piece will be used—is it utilitarian or decorative? For utility ware, I stick with one or two coats of thinned oil and a coat of paste wax. Buyers will readily understand that basic care requirements come with owning treenware. A thinned-oil finish is easily maintained by a non-woodworker.

Because decorative pieces will receive no exposure to water and only an occasional dusting, any oil-based finish will work, so other factors come into play. What sort of surface appearance do I want to achieve? Thinned oil produces a matte finish, polymerized oil and some oil/varnish finishes can build a film surface that is generally in the semi-gloss range, and wiping varnish can build to a glossy finish with noticeable depth, but may also leave wood looking like plastic.

Will there be voids in the completed piece (typical of burls), or natural bark inclusions or a bark rim? Does the wood contain spalt that will soak up finish at a different rate? Does the wood have large pores like oak? Getting an even finish on a porous surface is a challenge, especially with a film-building finish. I tend to reach for an oil/varnish blend in this situation for a little more luster than thinned oil and easy application over bark or in voids. Spalted wood can turn a sickly yellow color when finished with oil; many turners reach for an alternative, including buffing with wax, applying a water-based finish, or oiling only the solid wood surrounding the spalt.

How much time can I invest in this piece? If I am making a piece for market, I consider the potential return on my investment in time and materials—the quicker the finish, the greater the return on investment. But this must be balanced against visual appeal for the buyer and my own sense of aesthetics. In increasing order of time and expense required, oil-based finishes go from thinned oil, to oil/varnish and polymerized oil, to wiping varnish.

Domestic or tropical hardwood? Many tropical hardwoods contain non-curing oils that foil our finishes, inhibiting curing and leaving the wood surface gummy. The best alternative may be no applied finish. Many of these species can be brought to a beautiful natural finish simply by buffing. A coat of paste wax will offer some additional protection. Another trick for oily timbers is to first apply naphtha or acetone to remove the natural oils from the surface of the wood, and immediately follow up with an application of finish. I tend to reach for an oil/varnish blend or polymerized oil in this situation—both cure fairly quickly, and I hope before those natural oils rise to the surface again!

Finally, I recommend two exercises to improve understanding of finishing options. If you are curious about how a finish will cure, take a piece of glass or a metal lid and apply a few drops of finish. ▸

The magic moment—when the first coat of finish pops the grain and all the promises of beauty are fulfilled.

Do this with several different finishes on the same surface (label them), and then give them a few days to cure. The cured drops can be tested with a nail to see how hard they have become. Another trick is to create a finished surface on a turning before reaching the final dimensions. To this surface, I apply a few of my finish options in strips that go all the way around the form. This lets me evaluate how each finish will look on both side-grain and endgrain. After making a decision, I carry on with turning, removing the treated fibers.

Applying an oil-based finish

Application of oil-based finishes is simple and forgiving, which is a big part of their appeal. Most manufacturers recommend a wipe-on/wipe-off process with a specified waiting period before recoating. The idea is to liberally coat the surface of the piece, allow five to 10 minutes for the liquid to enter wood pores and saturate fibers, and remove the excess before it becomes gummy. The curing piece should be checked periodically and any oil bleeding out of the pores should be wiped away. Multiple coats increase build and any protective qualities the finish offers.

Food safety

This is another arena in which misleading marketing and myth rule supreme. All finishes are safe for food contact after they have cured, which occurs in 30 days or less. To determine if a finish has cured, plant your nose against the finished surface and inhale. If you can smell the finish, it has not cured. The Food and Drug Administration (FDA) thoroughly addresses food safety and finishes in a bulletin that is worth printing and keeping on hand, especially if you market your work (www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?FR=175.300).

A related topic is the concern over the potential allergenic properties of nut oils. Again, this concern is covered under the FDA's consideration of food safety. Proteins in nuts can cause an allergic response. These proteins are fairly delicate and exposure to high heat or organic solvents will modify them. The cross-linking that occurs during curing is the decisive step. Cross-linking changes the fundamental nature of the proteins, making them unavailable to react with other molecules, including the receptors in the human body that spark allergies.

Shop safety

Linseed, tung, and walnut oils, limonene, and mineral spirits are all relatively mild oils or solvents. Basic handling precautions are still warranted because these products are concentrated, and sensitization can come from cumulative exposure. Solvent-resistant gloves, eye protection, and a fresh air supply are minimum requirements. Applying commercial finishes containing stronger solvents should include a respirator that filters organic vapors.

Oils, solvents, and waxes are flammable. Take extra care disposing of oil-soaked rags as rapid oxidation can cause spontaneous combustion. Deposit oiled rags in a water-filled can or lay them out flat to cure before discarding. ■

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Shopmade finishes

Blending my own finishes allows me to use ingredients that are relatively benign, minimizing exposure to harsh chemicals. I can control the ratio of the components, affecting the rate of curing or surface build of the finish. My personal preference is for tung oil (water resistance, durability, ready availability). For a solvent I use limonene (or citrus solvent, *not* citra solve—a finish stripper), which is pressed from orange peels. Experiment by substituting raw walnut or linseed oil, or use mineral spirits or turpentine instead of limonene.

Thinned oil

1 part raw oil
1 part solvent

This is a great finish for treenware. With tung oil as a base I also use it on wood trim, floors, natural tile, and concrete countertops. It is versatile! The shelf life is at least six months, although I never keep it on hand that long. Label the container.

Thinned oil/varnish

1 part raw oil
1 part solvent
1 part satin or gloss varnish

This finish is easily applied with a shop towel, cloth, or varnish brush, and readily builds a surface film. The oil/varnish ratio can be altered to change application qualities or build properties. My biggest challenges are keeping dust out of the finish before it cures, and the short shelf life. I mix only what I can use in 24 hours.

Paste wax

2oz (59ml) raw oil
0.07oz (2g) carnauba wax
0.6oz (17g) beeswax
2oz (59ml) solvent

This recipe requires heating flammable ingredients! Use low heat and a double boiler **in the absence of a flame** and do not leave the pot unattended. Gently heat the wax and oil in a sacrificial pot until the wax has melted; remove from heat and stir in the solvent. Pour this mixture into a small, large-mouth container (a cosmetics jar works well) and let cool. Label the jar. Varying the ratio of waxes to oil/ solvent changes the consistency of the product. Shelf life is about four months.